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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/082,714	02/25/2002	Robert W. Henkens	4320-0018DIV.	5829

7590 06/08/2005

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EXAMINER	
RILEY, JEZIA	

ART UNIT	PAPER NUMBER
1637	

DATE MAILED: 06/08/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/082,714	HENKENS ET AL.	
	Examiner	Art Unit	
	Jezia Riley	1637	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 April 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) *17-21* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13,15 and 16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☒ Claim(s) *1-21* are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Remarks

1. Applicants' arguments, filed on 4/11/05, have been approved and entered. They have been fully considered. Rejections and/or objections not reiterated from previous office actions are hereby withdrawn. The following rejections and/or objections are either newly applied or reiterated. They constitute the complete set presently being applied to the instant application.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-12, 15 are rejected under 35 U.S.C. 102(e) as being anticipated by Wang et al. (US 6,063,259 A).

Wang et al. methods and apparatus for nucleic acid determination, more particularly for measurement of nucleic acids (e.g., DNA and RNA), and their sequences and interactions, and for detection of DNA damage, at thick-film electrodes, based on stripping potentiometry, at microfabricated screen-printed electrodes. The methods further comprise a new hybridization protocol for use with the sensors and the

combination of the sensor in a compact, user-friendly, hand-held analyzer to fulfill the current requirements for decentralized DNA diagnostics which is viewed as kits. Yet another advantage is that it provides a computerized chronopotentiometric operation which addresses the high background response inherent to carbon surfaces and offers substantial lowering of the detection limit, not only compared to analogous voltammetric stripping measurements, but also in comparison to stripping voltammetry at mercury electrodes, thus providing convenient quantitation of nanogram (ng) amounts of DNA and RNA which is viewed to be inclusive of the pulse amperometric monitor that detects and quantitates targets of instant claims 4 -6.

The reference discloses DNA and RNA spontaneously immobilizing onto the screen-printed electrode surface is used as an effective pre-concentration step, prior to a stripping determination using potentiometric stripping analysis. The sensor of the invention is a DNA/RNA sensor, having a nucleic acid-modified or -coated working electrode; various nucleic acids may be used as the modifier/coating, e.g., DNA, scDNA, RNA, tRNA. The nucleic acid-modified electrode may be a single or multiple array nucleic acid electrode. For example, if DNA is used as the modifier, the DNA may be double-stranded (dsDNA) for interaction reactions with, e.g., pollutants or drugs, or single-stranded (ssDNA) for hybridization (sequence specific) reactions. (col. 5).

The reference discloses a method (Method 2) which relies on the use of hybridization recognition events at a probe-coated strip electrode for sequence-selective

biosensing. The strong adsorption of single stranded nucleic acids onto the surface of the microfabricated strips results in stable coated electrodes that are used for recognizing complementary strands of nucleic acids. Other modes of accumulation may also be used (e.g., covalent attachment). According to Method 2, after the initial adsorption, the strip electrode, with the accumulated nucleic acid, is immersed in another solution containing the target strand and uses PSA for transducing the base pairing recognition event. (The method is describes in col. 6 lines 45-55 and show that an electric potential is applied to the working electrode when the attached nucleic acid segments hybridize to nucleic acid targets).

The reference discloses the operation of the microfabricated DNA strips is combined with a hand-held, battery-operated, potentiometric stripping analyzer which is viewed to be inclusive of instant claim 7; the compact consists of a potential control, current source and the single computer board. Built-in software controls the entire sequence of events, including the pretreatment/adsorption/stripping cycle, data handling and display which is on a liquid crystal. (col. 7, lines 58-67). And which is viewed as being inclusive of the single key start operation of instant claim11 and the integrated microprocessor of instant claim 10.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1-13, 15, 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al. (US 6,063,259 A) in view of Murtagh (5,518,901) .

Wang et al. methods and apparatus for nucleic acid determination, more particularly for measurement of nucleic acids (e.g., DNA and RNA), and their sequences and interactions, and for detection of DNA damage, at thick-film electrodes, based on stripping potentiometry, at microfabricated screen-printed electrodes. The methods further comprise a new hybridization protocol for use with the sensors and the combination of the sensor in a compact, user-friendly, hand-held analyzer to fulfill the current requirements for decentralized DNA diagnostics which is viewed as kits.

Yet another advantage is that it provides a computerized chronopotentiometric operation which addresses the high background response inherent to carbon surfaces and offers substantial lowering of the detection limit, not only compared to analogous voltammetric stripping measurements, but also in comparison to stripping voltammetry at mercury electrodes, thus providing convenient quantitation of nanogram (ng) amounts of DNA and RNA which is viewed to be inclusive of the pulse amperometric monitor that detects and quantitates targets of instant claims 4 -6.

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recognizing complementary strands of nucleic acids. Other modes of accumulation may also be used (e.g., covalent attachment). According to Method 2, after the initial adsorption, the strip electrode, with the accumulated nucleic acid, is immersed in another solution containing the target strand and uses PSA for transducing the base pairing recognition event. (The method is describes in col. 6 lines 45-55 and show that an electric potential is applied to the working electrode when the attached nucleic acid segments hybridize to nucleic acid targets).

The reference discloses the operation of the microfabricated DNA strips is combined with a hand-held, battery-operated, potentiometric stripping analyzer which is viewed to be inclusive of instant claim 7; the compact consists of a potential control, current source and the single computer board. Built-in software controls the entire sequence of events, including the pretreatment/adsorption/stripping cycle, data handling and display which is on a liquid crystal. (col. 7, lines 58-67). And which is viewed as being inclusive of the single key start operation of instant claim11 and the integrated microprocessor of instant claim 10.

Murtagh discloses method for detecting the presence of nucleotide sequence within a double stranded DNA in a sample comprising the step of digesting the double stranded DNA with exonuclease which converts at least a portion of the double-stranded DNA to single-stranded DNA.

Therefore it would have been obvious at the time the invention was made to use the biosensor of Wang et al. wherein the nucleic acid segments are hybridized with single strand DNA generated from amplified genomic DNA sample digested with an exonuclease since Wang discloses that the sensor usefulness extends to testing and analysis for a wide variety of diseases and for routine testing of DNA which is viewed to be inclusive of DNA from an amplified genomic DNA sample digested with exonuclease. The resulting single-strand DNA is then highly reactive with oligonucleotide probes, which can then be used to capture DNA to solid support (microtiter plates, coated magnetic or agarose particles, treated nylon or glass, etc.). Each step proceeds efficiently and rapidly in standard buffers used for PCR. Following conversion to single strands and specific capture, a second oligonucleotide can be used to detect the complex. In principle, the hybridization assay is similar to other colorimetric hybridizations previously used to detect denatured double-strand DNA. However, simple conversion to single strands by exonuclease is found to enhance colorimetric hybridization signal by 100-fold (Example 1), resulting in greater specificity, and is more convenient and automatable than procedures commonly used to denature PCR products. (Murtagh col. 15).

6. Claim 14 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for response to this final action is set to expire THREE MONTHS from the date of this action. In the event a first response is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event will the statutory period for response expire later than SIX MONTHS from the date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jezia Riley whose telephone number is 571-272-0786. The examiner can normally be reached on 9:30AM - 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gary Benzion can be reached on 571-272-0782. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Thursday, June 02, 2005

JEZIA RILEY
PRIMARY EXAMINER